



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/578,003	05/03/2006	Hideo Nakagawa	071971-0548	5215
53080	7590	01/11/2008		EXAMINER
MCDERMOTT WILL & EMERY LLP				WILLIAMS, ALEXANDER O
600 13TH STREET, NW			ART UNIT	PAPER NUMBER
WASHINGTON, DC 20005-3096			2826	
				MAIL DATE
				DELIVERY MODE
			01/11/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/578,003	NAKAGAWA ET AL.
	Examiner	Art Unit
	Alexander O. Williams	2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 23 December 2007.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-53 is/are pending in the application.
- 4a) Of the above claim(s) 2,4,5 and 8-53 is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1,3,6 and 7 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date 5/3/06.
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application
- 6) Other: _____.

Art Unit: 2826

Serial Number: 10/578003 Attorney's Docket #: 071971-0548
Filing Date: 5/3/2006; claimed foreign priority to 6/3/2004

Applicant: Nakagawa et al.

Examiner: Alexander Williams

Applicant's election of Species II, identifying figures 2a and 2b (claims 1, 3, 6 and 7), filed 10/23/2007, has been acknowledged.

This application contains claims 2, 4, 5 and 8-53 drawn to an invention non-elected without traverse.

Applicant's Pre-Amendment filed 5/3/06 has been acknowledged.

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 3, 6 and 7 are rejected under 35 U.S.C. § 102(e) as being anticipated by Seto et al. (U. S. Patent Application Publication # 2004/0038520 A1).

1. Seto et al. (figures 1 to 7) specifically figure 1d show a semiconductor device comprising: an insulation film **6,8** formed on a substrate **2**; a buried metal interconnect **12a** formed in the insulation film; and a barrier metal film **10** formed between the insulation film and the metal interconnect, wherein the barrier metal film is a metal compound film, and wherein the metal compound film contains at least one of elements forming the

Art Unit: 2826

insulation film (see paragraph [0018]-[0023]).

3. The semiconductor device of claim 1, Seto et al show wherein the metal compound film is a metal oxide film, and wherein the insulation film contains oxygen.

6. The semiconductor device of claim 1, Seto et al. show wherein a metal forming the metal compound film is a refractory metal.

7. The semiconductor device of claim 1, Seto et al. show wherein the metal interconnect is formed of copper or an copper alloy.

Claims 1, 3, 6 and 7 are rejected under 35 U.S.C. § 102(e) as being anticipated by Mitsui et al. (U.S. Patent # 6,693,318 B1).

1. Mitsui et al. (figures 1(a)-1(e)) specifically figure 1(e) show a semiconductor device comprising: an insulation film **2** formed on a substrate **1**; a buried metal interconnect **3** formed in the insulation film; and a barrier metal film **6** formed between the insulation film and the metal interconnect, wherein the barrier metal film is a metal compound film, and wherein the metal compound film contains at least one of elements forming the insulation film.

3. The semiconductor device of claim 1, Mitsui et al. show wherein the metal compound film is a metal oxide film, and wherein the insulation film contains oxygen.

Art Unit: 2826

6. The semiconductor device of claim 1, Mitsui et al. show wherein a metal forming the metal compound film is a refractory metal.

7. The semiconductor device of claim 1, Mitsui et al. show wherein the metal interconnect is formed of copper or an copper alloy.

Claims 1, 3, 6 and 7 are rejected under 35 U.S.C. § 102(b) as being anticipated by Hattori et al. (Japan Patent Publication # 05-218035).

1. Hattori et al. (figures 1 and 2) specifically figure 1 show a semiconductor device comprising: an insulation film **2** formed on a substrate **1**; a buried metal interconnect **3** formed in the insulation film; and a barrier metal film **4** formed between the insulation film and the metal interconnect, wherein the barrier metal film is a metal compound film, and wherein the metal compound film contains at least one of elements forming the insulation film.

3. The semiconductor device of claim 1, Hattori et al. show wherein the metal compound film is a metal oxide film, and wherein the insulation film contains oxygen.

6. The semiconductor device of claim 1, Hattori et al. show wherein a metal forming the metal compound film is a refractory metal.

7. The semiconductor device of claim 1, Hattori et al. show wherein the metal interconnect is formed of copper or an copper alloy.

Art Unit: 2826

Claims 1, 6 and 7 are rejected under 35 U.S.C. § 102(b) as being anticipated by Ueno (Japan Patent Publication # 2000-252357).

1. Ueno (figures 1 to 5) specifically figure 5 show a semiconductor device comprising: an insulation film **4** formed on a substrate **2**; a buried metal interconnect **8** formed in the insulation film; and a barrier metal film **10** formed between the insulation film and the metal interconnect, wherein the barrier metal film is a metal compound film, and wherein the metal compound film contains at least one of elements forming the insulation film.

6. The semiconductor device of claim 1, Ueno show wherein a metal forming the metal compound film is a refractory metal.

7. The semiconductor device of claim 1, Ueno show wherein the metal interconnect is formed of copper or an copper alloy.

Claims 1, 6 and 7 are rejected under 35 U.S.C. § 102(e) as being anticipated by Akahori (U.S. Patent # 6,720,659 B1).

1. Akahori (figures 1a to 17) specifically figure 16 show a semiconductor device comprising: an insulation film **83** formed on a substrate **82**; a buried metal interconnect **85** formed in the insulation film; and a barrier metal film **88** formed between the insulation film and the metal interconnect, wherein the barrier metal film is a metal compound film, and wherein the metal compound film contains at least one of elements forming the insulation film.

6. The semiconductor device of claim 1, Akahori show wherein a metal forming the metal compound film is a refractory metal.

Art Unit: 2826

7. The semiconductor device of claim 1, Akahori show wherein the metal interconnect is formed of copper or an copper alloy.

Claims 1, 6 and 7 are rejected under 35 U.S.C. § 102(b) as being anticipated by Faust et al. (U.S. Patent Application Publication # 2002/0001944 A1).

1. Faust et al. (figures 1 to 4D) specifically figure 1 show a semiconductor device comprising: an insulation film **16** formed on a substrate **100**; a buried metal interconnect **18** formed in the insulation film; and a barrier metal film **14** formed between the insulation film and the metal interconnect, wherein the barrier metal film is a metal compound film, and wherein the metal compound film contains at least one of elements forming the insulation film.

6. The semiconductor device of claim 1, Faust et al. show wherein a metal forming the metal compound film is a refractory metal.

7. The semiconductor device of claim 1, Faust et al. show wherein the metal interconnect is formed of copper or an copper alloy.

Claims 1, 6 and 7 are rejected under 35 U.S.C. § 102(e) as being anticipated by Oizumi et al. (U.S. Patent # 6,747,353 B2).

1. Oizumi et al. (figures 1 to 5) specifically figure 2c show a semiconductor device comprising: an insulation film **18** formed on a substrate **16**; a buried metal interconnect **22** formed in the insulation film; and a barrier metal film **20** formed between the insulation film and the metal interconnect, wherein the barrier metal film is a metal compound film, and wherein the metal

Art Unit: 2826

compound film contains at least one of elements forming the insulation film.

6. The semiconductor device of claim 1, Oizumi et al. show wherein a metal forming the metal compound film is a refractory metal.

7. The semiconductor device of claim 1, Oizumi et al. show wherein the metal interconnect is formed of copper or an copper alloy.

The listed references are cited as of interest to this application, but not applied at this time.

Field of Search	Date
U.S. Class and subclass: 257/751,752,762,764,758,774,773	12/30/07
Other Documentation: foreign patents and literature in 257/751,752,762,764,758,774,773	12/30/97
Electronic data base(s): U.S. Patents EAST	12/30/97

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander O. Williams whose telephone number is (571) 272 1924. The examiner can normally be reached on M-F 6:30AM-7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272 1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2826

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Alexander O. Williams
Primary Examiner
Art Unit 2826

AOW
1/6/08